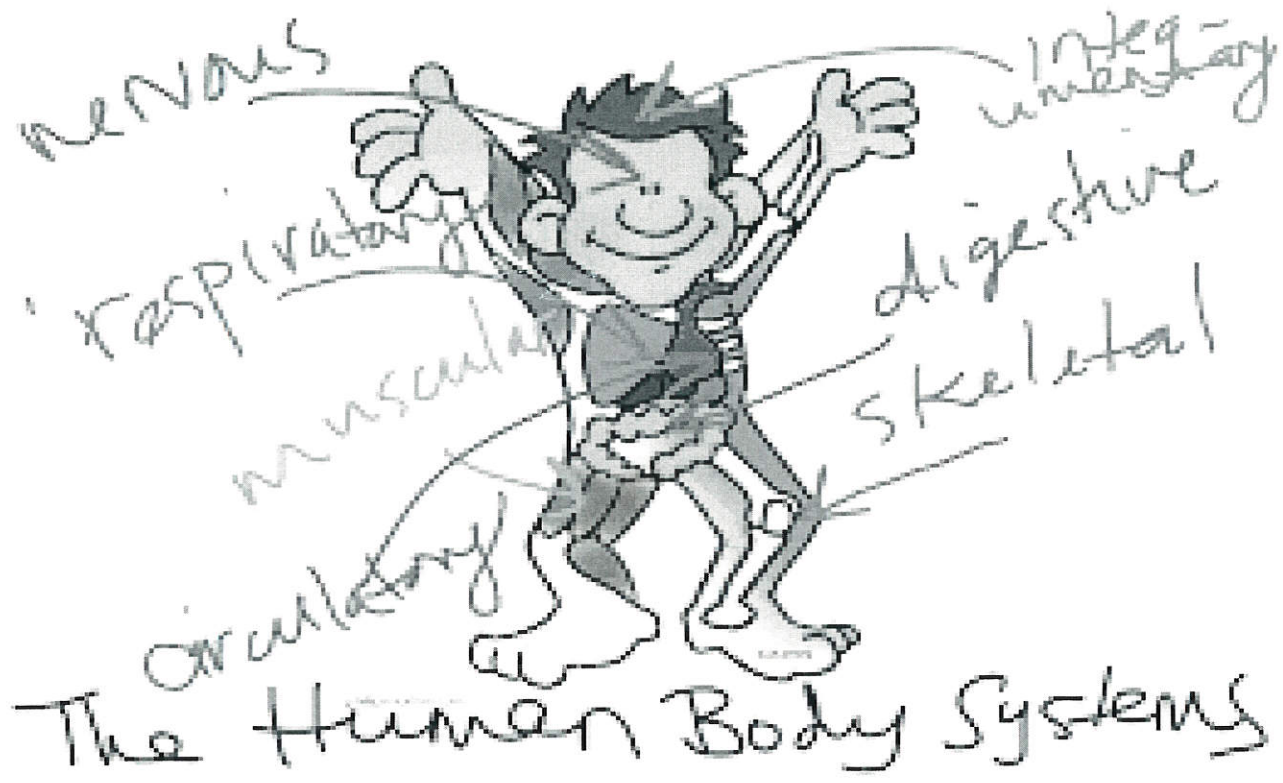


Name: _____

Science Teacher: _____ Period: _____



Body Systems Workbook

Hopewell Middle School 7th Grade Science

Unit 7: Human Body Systems

TEKS Analysis

TEKS 7.6B- distinguish between physical and chemical changes in matter in the digestive system [supporting standard]

PHYSICAL CHANGE

1. a change in size, shape, or state
2. no new substance is formed

CHEMICAL CHANGE

1. a change in the physical and chemical properties
2. a new substance is formed

Identify the following as physical (P) or chemical (C) changes.

1. NaCl (Table Salt) dissolves in water. _____
2. Ag (Silver) tarnishes. _____
3. An apple is cut. _____
4. Heat changes H₂O to steam. _____
5. Baking soda reacts to vinegar. _____
6. Fe (Iron) rusts. _____
7. Alcohol evaporates. _____
8. Ice melts. _____
9. Milk sours. _____
10. Sugar dissolves in water. _____
11. Wood rots. _____
12. Pancakes cook. _____
13. Grass grows. _____
14. A tire is inflated. _____
15. Food is digested. _____
16. Paper towel absorbs water. _____

TEKS 7.12B- identify the main functions of the systems of the human organism including circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems [supporting standard]

In the past you have practiced comparing organisms structures to its function, and how it supports the life of the organism. Use one of the human body systems listed above and describe its function (what it does) in the body. Include at least one organ that takes part in this system.

Essential Questions

How do physical and chemical changes in matter in the digestive system compare?

How does the digestive system break down large molecules into smaller molecules?

Essential Question

What are the major functions of the human body systems?

How is structure and function related in human body system?

How do the functions of a cell compare to the functions of an organism?

TEKS 7.13B- describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance.

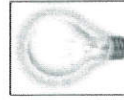
Describe a plants lacking response to lack of water and how it affects the cell of the organism. Use scientific vocabulary to justify your response.

Describe why the body would respond by causing a fever or vomiting in an organism. Use scientific vocabulary to justify your response.

TEKS 7.7B- illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion

For the following devices state what type of Energy is used from this list:

Chemical Kinetic Heat (thermal) Sound Electrical Light



Light bulb:

Input Energy _____
Useful Energy _____ Waste Energy _____



Electric Drill:

Input Energy _____
Useful Energy _____
Waste Energy _____ & _____



What type of

Energy is used in the human body?

Input Energy _____
Useful Energy _____
Waste Energy _____

Essential Question

How does the human body respond to external and internal stimuli in order to maintain homeostasis?

Essential Question

How do energy transformations occur within organism?

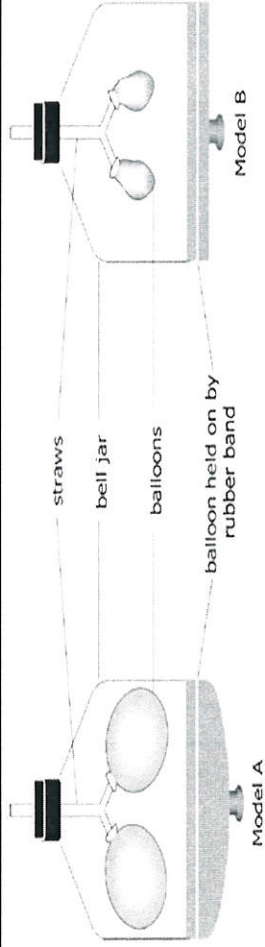
Daily Work

	A	B	C	D	E
1	<p>The main function of the respiratory system is to –</p> <p>A. rapidly communicate specific information using electrical impulses.</p> <p>B. exchange gases, mostly carbon dioxide and oxygen, between the body and the atmosphere.</p> <p>C. send signals in the form of hormones to the body to control growth, reproduction, and metabolism.</p> <p>D. filter body fluids to remove waste products from the bloodstream.</p>	<p>Name the major organs of the excretory system:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Maintaining internal stability (sweating, chill bumps, stomach growls, movement of nutrients in and waste out through cell membranes)</p> <p>_____</p>	<p>System that fights disease and controls the immune response</p> <p>_____</p> <p>_____</p>	
2	<p>What is the function of arteries?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>What is the function of veins?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Name the major organs of the circulatory system:</p> <p>_____</p> <p>Name the major organs of the respiratory system:</p> <p>_____</p>	<p>Which system is responsible for removing waste from your body, filtering waste from blood and controls water balance?</p> <p>_____</p> <p>_____</p>	
3	<p>The main function of the circulatory system is to –</p> <p>A. convert food into simpler substances for the body to absorb as nutrients.</p> <p>B. exchange gases, mostly carbon dioxide and oxygen, between the body and the atmosphere.</p> <p>C. send signals in the form of hormones to the body to control growth, reproduction, and metabolism.</p> <p>D. transport blood through the body to supply cells with oxygen and nutrients.</p>	<p>What body system is considered the “highway” system in the body because it transports nutrients and oxygen to cells?</p> <p>_____</p> <p>_____</p>	<p>What is the main function of the endocrine system?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Different parts of the circulatory system are adapted for different functions. A blood vessel that is very narrow and has thin walls is most likely specialized for –</p> <p>A. storing blood until it is needed</p> <p>B. passing materials in blood to cells</p> <p>C. carrying blood over long distances</p> <p>D. withstanding high blood pressures</p>	

List the system each organ belongs to:

1. Lung-- _____
2. Heart-- _____
3. Skull-- _____
4. Blood-- _____
5. Brain-- _____
6. Kidney-- _____
7. Bicep-- _____

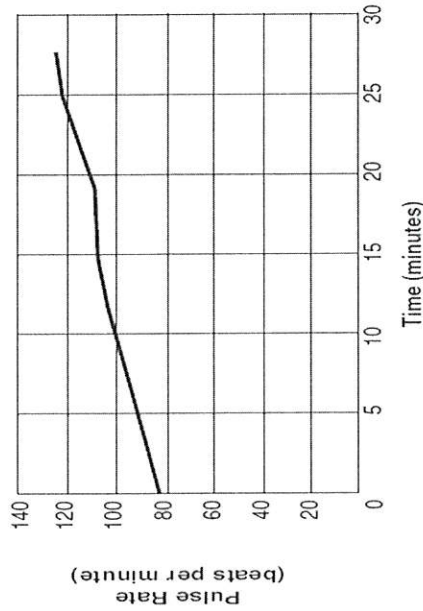
4



Models A and B represent the organ system in the body that is responsible for —

- A. movement of bones
- B. breaking down food into useable parts
- C. transporting materials throughout the body
- D. taking in oxygen and releasing carbon dioxide

Changes in Pulse Rate during Jogging



The body systems most involved in the jogging activity data are the —

- A. digestive, circulatory, and nervous systems
- B. skeletal, muscular, and respiratory systems
- C. muscular, skeletal, and circulatory systems
- D. respiratory, digestive, and nervous systems

5

A student conducts an experimental investigation to determine if her lung capacity changes as a result of exercising. First, the student inhales normally, then exhales normally into a balloon and ties the end of the balloon. Next, the student uses a measuring tape to measure the diameter of the balloon and records the measurement in a data table. These procedures are repeated three times. The student exercises every day but only collects data every 10 days. The data table summarizes the average diameter of the balloon during the investigation.

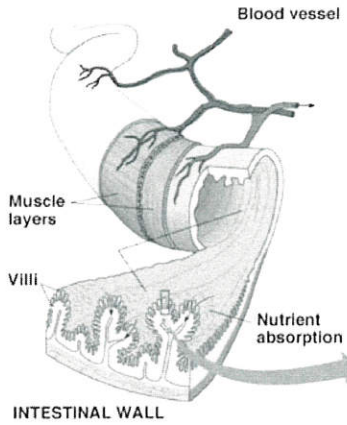
Effects of Exercise on Lung Capacity	
Days of Training	Average Diameter of Balloon (cm)
0	48
10	48.3
20	48.7
30	49
40	49.4
50	49.7
60	50.1

Which body system is the student testing?

- A. Circulatory
- B. Digestive
- C. Muscular
- D. Respiratory

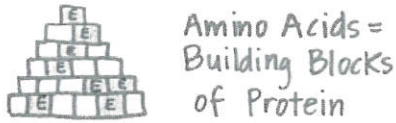
5

1 absorption



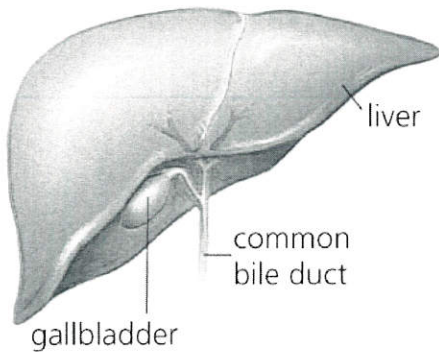
Digested products moving into blood stream

2 amino acids



Building blocks of protein

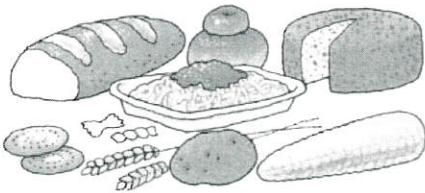
3 bile



A substance produced by the liver that breaks up fat particles.

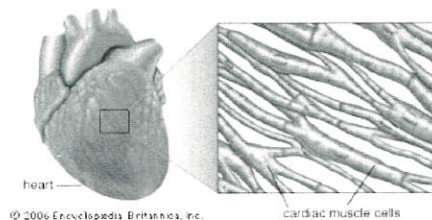
4 carbohydrates

Carbohydrates These starchy foods give us energy and warmth



Broken down to glucose to provide energy.

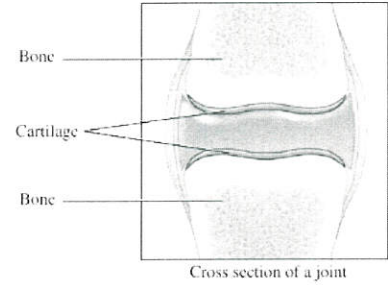
5 cardiac muscle



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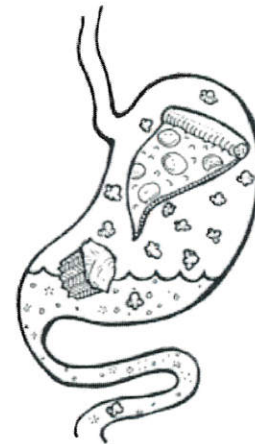
Muscle of the heart

6 cartilage



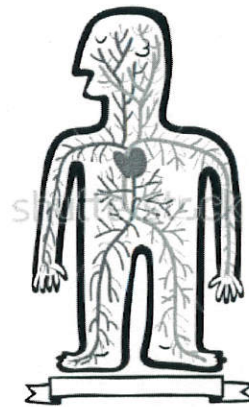
A connective tissue that is more flexible than bone and that protects the ends of bones and keeps them from rubbing together.

7 chemical digestion



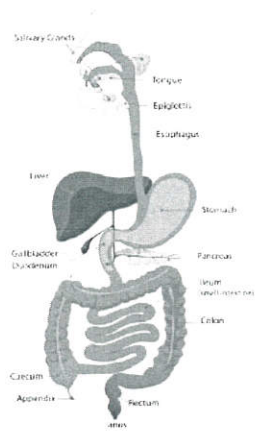
the digestion process in which enzymes are used to break foods into their smaller chemical building blocks

8 circulatory system



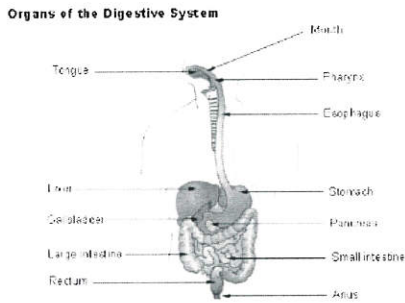
Consists of the heart, blood vessels, and the blood. Fundamental purpose is to transport substances from place to place in the body

9 digestion



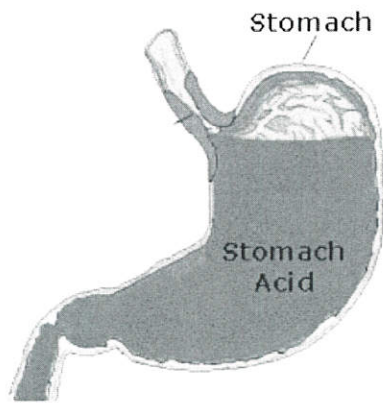
Breaking down food

10 digestive system



Breaks down food into smaller molecules. Absorbs these nutrients into the body.

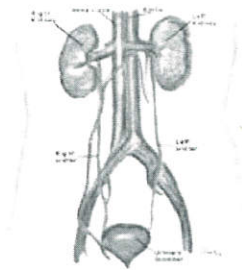
11 enzyme



A type of protein that speeds up a chemical reaction in a living thing

12 excretory system

Excretory System
• Removal of waste from the body



the system that removes waste from your body and controls water balance

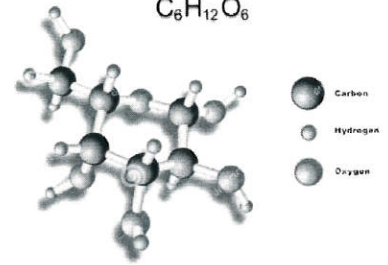
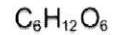
13 fats



Also called lipids, provides energy and help your bod absorb vitamins.

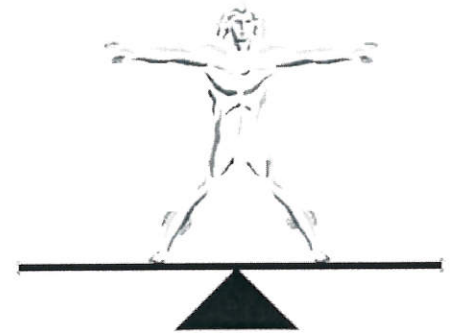
14 glucose

Glucose



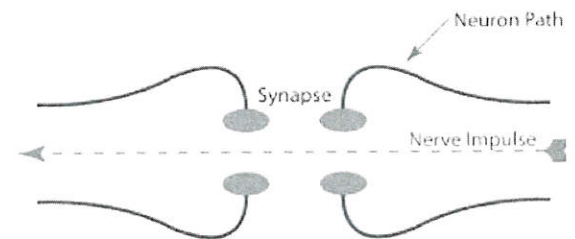
A kind of sugar the cell uses.

15 homeostasis



Maintaining internal stability (sweating, chill bumps, stomach grows, movement of nutrients in and waste c through cell membrane)

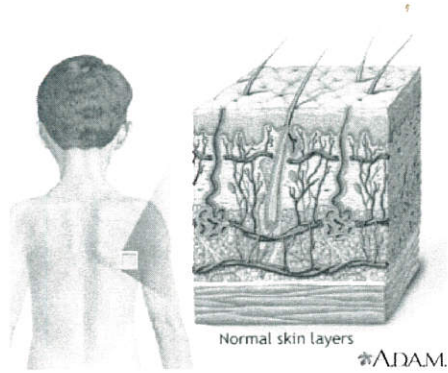
16 impulse



A message carried by neurons to one part of the bod from another.

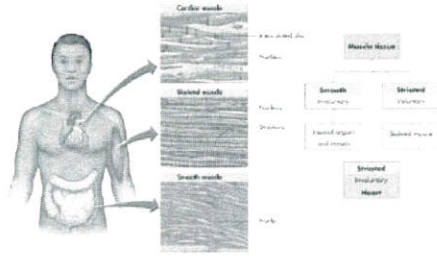
7

17 integumentary system



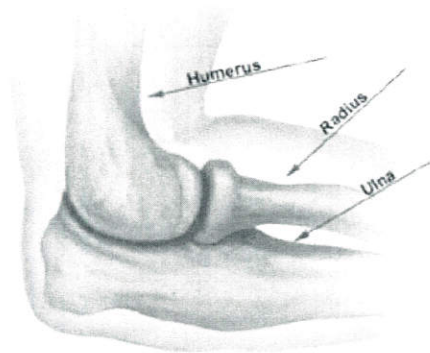
Consists of the skin, mucous membranes, hair, and nail

18 involuntary muscle



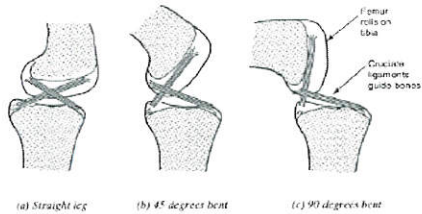
a muscle that contracts without conscious control and found in walls of internal organs such as stomach and intestine and bladder and blood vessels (excluding the heart)

19 joint



A place in the body where two bones come together

20 ligament



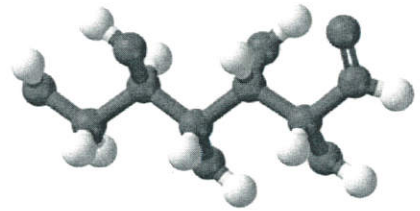
Connective tissue that connects bone to bone

21 mechanical digestion



Takes place when food is chewed, mixed, and churned.

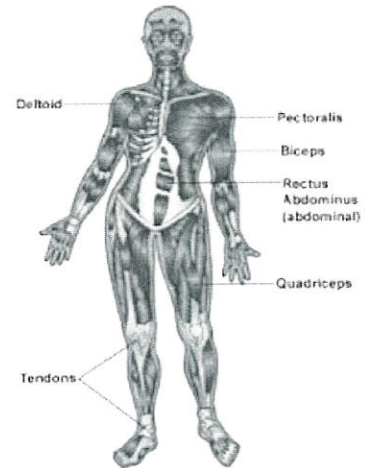
22 molecules



Molecule

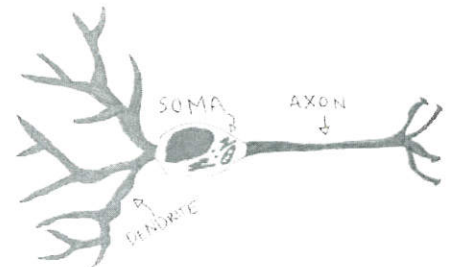
Chemicals that result from atoms linking together.

23 muscular system



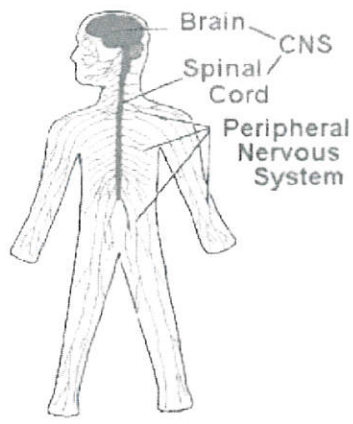
Consists of skeletal muscles, tendons that connect muscles to bones, and ligaments that attach bones together to form joint

24 nerve



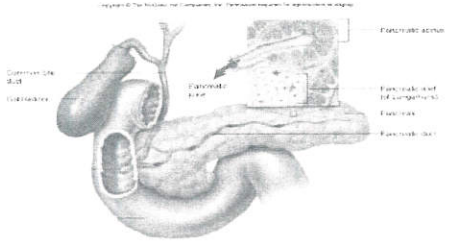
A bundle of nerve fibers.

25 nervous system



Detects information from the environment and controls body functions

26. pancreatic juices



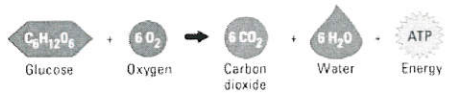
Enzymes that break down lipids, starches and proteins

27 peristalsis



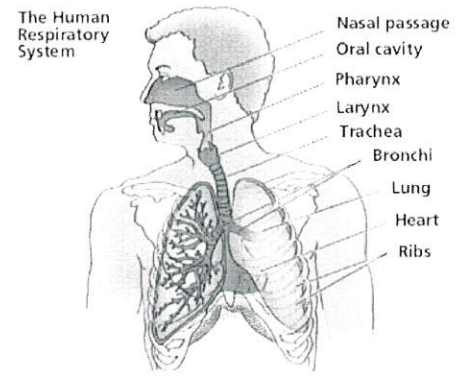
Involuntary waves of muscle contraction that keep food moving along in one direction through the digestive system.

28 respiration



Act of breathing; the exchange of carbon dioxide and oxygen in the lungs and within each cell

29 respiratory system



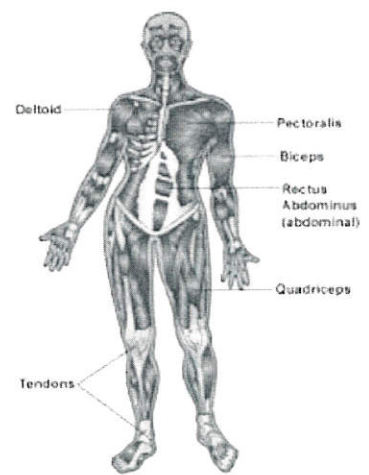
system responsible for taking in oxygen and releasing carbon dioxide using the lungs

30 shivering



Rapid contraction of muscles, requiring energy and therefore creating heat, to warm the body.

31 skeletal muscle

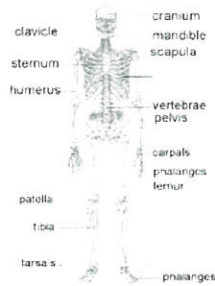


A muscle that is attached to the bones of the skeleton and provides the force that moves the bones; voluntary

9

32 skeletal system

Skeletal System- provide support



Protects and supports organs and provides a framework the muscles use to support movement. Made up of bones and joints.

33 smooth muscle

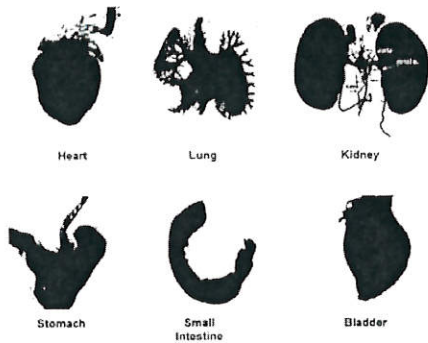
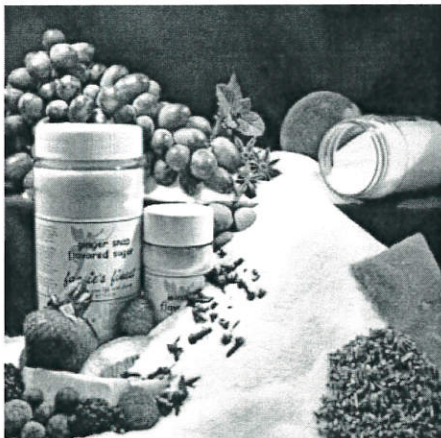


FIG. 1

Involuntary muscle found inside many internal organs of the body

34 sugars



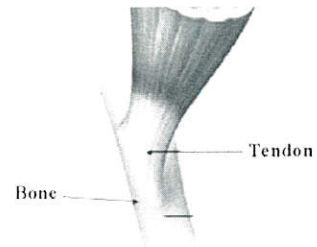
carbohydrates found both in food and in the body

35 sweating



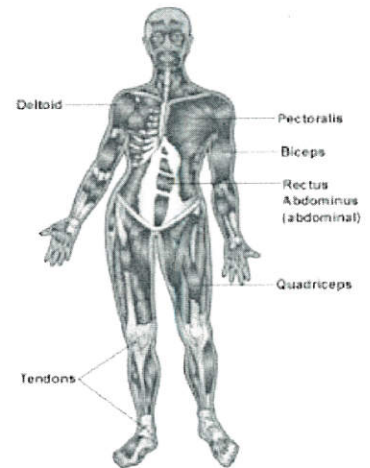
Getting rid of excess heat through pores in the skin to stay cool.

36 tendon



connective tissue that connects muscle to bone.

37. voluntary muscles



Muscles that you are able to control



It all Starts in your Mouth

Digestion actually begins in your mouth. Your teeth and tongue tear food into smaller pieces and enzymes in your saliva can digest some types of food. In this station you are going to investigate what happens to starch in the form of a cracker when placed in your mouth.

Prediction:

What do you think will happen to the cracker when you place it in your mouth?

Procedure:

Thoroughly read all of the steps before you begin the activity!!

1. Carefully break the cracker in half.
2. Put half of the cracker in your mouth. **Do not chew or swallow!**
3. Wait several minutes and allow the cracker to become soggy from the saliva secreted in your mouth.
4. Did you notice any change in the taste of the cracker?
5. Record your findings in your student notebook.
6. Chew the soggy cracker and swallow. It will reach the stomach within 4-8 seconds.

Reflection Questions:

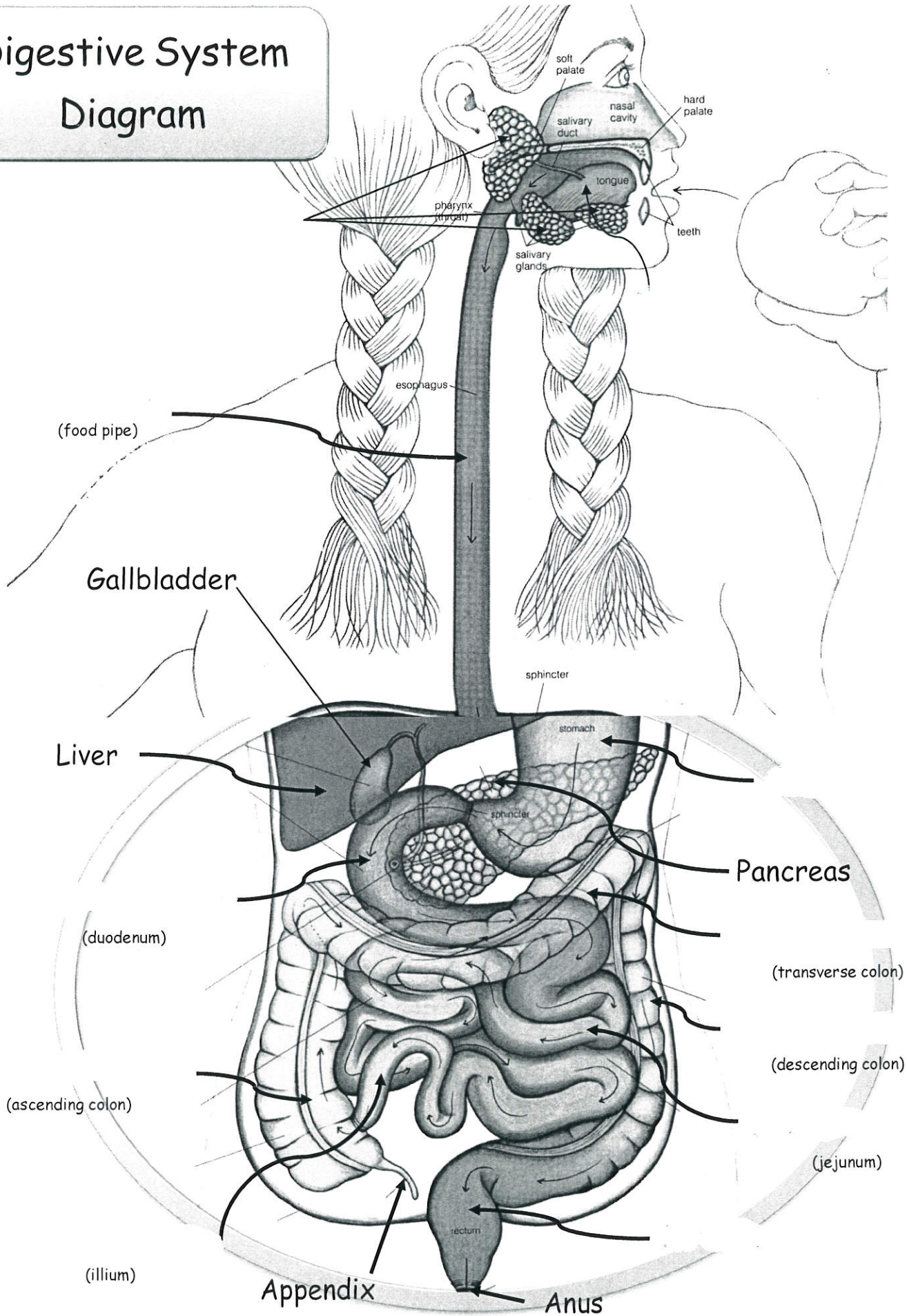
1. What did you observe happening to the cracker as it interacted with the saliva in your mouth?
2. Was the digestion of the cracker in your mouth a chemical change, physical change or both?
3. What evidence do you have to support your claim of a chemical change, physical change or both?

Did you detect a mildly sweet taste after the cracker got soggy? If not place the other half of the cracker in your mouth and try again; wait a little longer this time.

An enzyme in your saliva is working to chemically digest the cracker. The large starch molecules are digested into more simple sugar molecules. This sugar is glucose. It is not as sweet as sucrose which is table sugar. The final digestion of starch in the cracker will occur later in the digestive process.

4. How do chemical and physical digestion work together to digest the cracker in your mouth?
5. What is happening to the starch molecules when they come in contact with your saliva?

Digestive System Diagram



12

FUNCTIONS OF THE DIGESTIVE SYSTEM

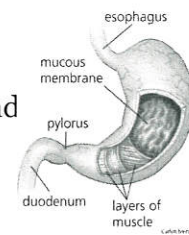
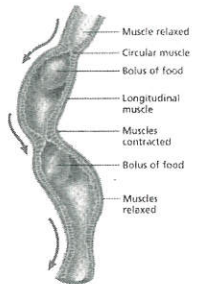
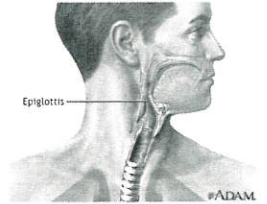
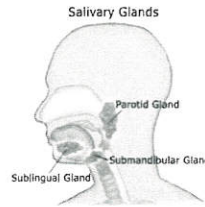
1. _____ = food enters the mouth
2. _____ = process that _____ food _____ into small molecules
 - a) _____ digestion = food is chewed and churned
 - b) _____ digestion = breaks down large food molecules into smaller molecules to be absorbed by cells
3. _____ = small molecules of food are taken into the _____
4. _____ = _____ made of unabsorbed food molecules pass out of the body

Which is NOT a function of the digestive system?

- a) breaking down food into molecules the body can use
- b) absorbing food molecules into the blood to deliver to the body
- c) changing waste into molecules the body can use
- d) eliminating undigested waste from the body

ORGANS OF THE DIGESTIVE TRACT

1. _____ = digestion starts here
 - a. Tongue & teeth _____ break food up
 - b. Saliva _____ digests food
 - Saliva = mostly made of _____, also contains mucus & ptyalin (an enzyme)
 - c. When swallowing, _____ (a small flap of tissue) automatically closes over the _____ (windpipe)
2. _____
 - a. _____ muscles force food into the mucus-lined esophagus
 - b. Rhythmic muscular contractions (_____) push food _____
3. _____
 - a. Food undergoes _____ digestion when stomach muscles _____ the food
 - b. _____ digestion happens when hydrochloric acid (_____) and _____ break down the complex proteins
 - c. _____ pushes the food toward stomach's exit



Which is NOT an example of mechanical digestion?

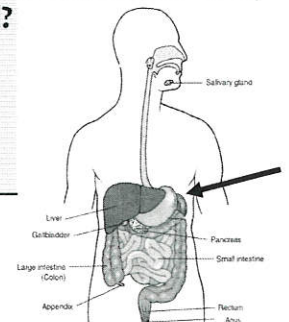
- | | |
|----------------------------|--|
| a) teeth chewing food | c) smooth muscles in stomach churning food |
| b) tongue breaking up food | d) Pepsin & HCl breaking down proteins |

What are the muscle contractions that push food through the digestive system called?

- | | | | |
|----------------|----------------|---------------|-----------|
| a) elimination | b) peristalsis | c) epiglottis | d) pepsin |
|----------------|----------------|---------------|-----------|

What is this structure called?

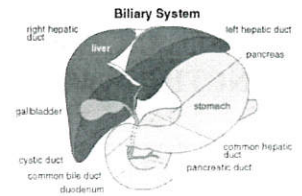
- | | | | |
|----------|---------------|--------------|------------|
| a) mouth | b) epiglottis | c) esophagus | d) stomach |
|----------|---------------|--------------|------------|



13

4. _____ (6 meters long)

- a. _____ digestion happens here
- b. Intestinal juice (full of _____) breaks down food
- c. Digestive Helpers
 - _____ = _____ is produced here (Bile _____ like dish detergent breaks up grease)
 - _____ = bile is _____ here until released into the small intestine
 - _____ = produces pancreatic juices that are released into the small intestine to break down _____, _____, & _____
- d. Digested food is _____ through the _____ into a network of blood vessels that carry the nutrients to all parts of the _____
- e. By the time food leaves the small intestine, it is _____ of all nutrients except _____



Where does most digestion take place?

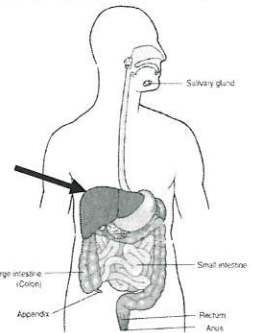
- a) mouth
- b) stomach
- c) small intestine
- d) liver

Which is true about bile?

- a) Bile breaks down proteins.
- b) Bile is produced in the liver.
- c) Bile is stored in the pancreas.
- d) Bile is released into the stomach.

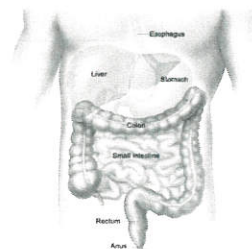
What is this structure called?

- a) liver
- b) stomach
- c) gall bladder
- d) pancreas



5. _____ (1.5 meters long)

- a. Undigested food spends _____ hours here & most of the water is _____
- b. Helpful _____ living in large intestine make vitamins ___ & ___
- c. Materials not absorbed form into _____ (dead _____, some _____ & _____, undigested food, dried out parts of digestive juices & old intestinal _____)
- d. Solid waste passes into the _____ and is stored until it is eliminated from the body through the _____



Which process occurs in the large intestine?

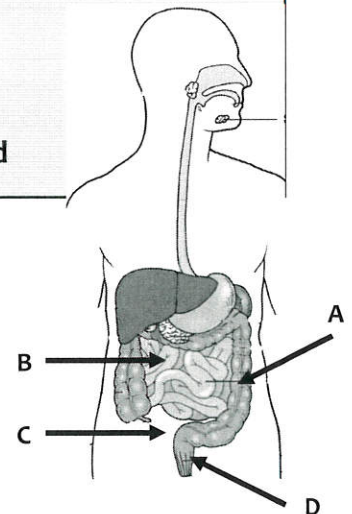
- a) Digested food is absorbed.
- b) Undigested food is absorbed.
- c) Water is added to undigested food.
- d) Water is absorbed from undigested food.

Which structure is the large intestine?

- a) A
- b) B
- c) C
- d) D

What do the bacteria in the large intestine do?

- a) make you sick
- b) make bile
- c) make vitamins
- d) make food





Be on the Lookout

Term	Digestive System Connection How does it relate to the digestive system?	Location Where does the term occur in the digestive system?	Memory Clue How can you remember this word?
peristalsis			
absorption			
villi			
enzymes			

Digestive System Notes

Organ	Mouth	Esophagus	Stomach	Small Intestine	Large Intestine
What happens here during digestion?					
Picture/illustration of organ					

List three functions of the digestive system		
1	2	3

Energy Transformation in your Digestive System

Types of Energy

Kinetic-energy of motion

Mechanical-energy of matter because of its motion or position

Radiant-energy of light (electromagnetic waves)

Thermal-energy of temperature (particles in hot water move faster than particles in cold water)

Electrical-energy produced by electrical charges (movement of electrons)

Potential-stored energy

Gravitational Potential Energy-energy based on an object's position above the Earth

Chemical-energy stored in matter because of its chemical makeup (food, fossil fuels)

Energy Transformations

-the energy in matter can change, or transform, from one form to another

-energy cannot be created or destroyed, it just changes forms

-when you "use" energy, you are really just transforming it to another form

-in a flashlight, the chemical energy of the battery is converted into electrical energy which is then converted into radiant (light) and thermal energy

-radiant energy from the sun is converted into chemical energy stored in plants during photosynthesis

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-often in energy transformations, some energy is "lost" to thermal energy (this means that heat is given off during an energy transformation even though heat is not needed)

Energy Transformation inside of you

- the food you eat is chemical energy
- your digestive system breaks the food down into molecules that are the nutrients and energy you need for survival
- the chemical energy in your food is converted to different chemical energy and thermal energy
- the thermal energy is given off as heat

-the chemical energy (molecules such as carbohydrates) travels around your body in your circulatory system until it is used by various cells

-the cells then use that energy to allow body movement
-this is when the chemical energy is transformed into mechanical energy

-skeletal muscle cells contract and relax to allow movement
-blood cells travel through the blood vessels to provide more energy and nutrients to other cells

-smooth muscle cells in the digestive system move food along to continue the process of energy conversion

The human body is able to convert chemical energy stored in food into mechanical energy so a person can move.

The Excretory System - The Facts

(18)

1. The job of the excretory system is to take waste out of the body.
2. The kidneys are the most important part of the excretory system.
3. Other organs that get rid of wastes are the liver, skin, lungs, and large intestine.

KIDNEYS

1. The kidneys are two reddish-brown organs about four inches long.
2. The kidneys are in the lower back on each side of the backbone.
3. The kidneys are made of millions of tiny tubes and cells.
4. These tubes pull liquid waste from the blood.
5. The liquid waste is called urine.
6. Urine is stored in the bladder until it is passed out of the body.

LUNGS, LIVER, and INTESTINE

1. Lungs remove carbon dioxide when you breathe out.
2. The liver takes out waste that is floating in the blood.
3. The muscles of the large intestine push waste food out of the body.

SKIN

1. The skin is the largest excretory organ.
2. The skin gives off waste by sweating.
3. Sweat is made of water and salt.
4. Sweat passes through tiny holes in the skin.
5. Tiny holes in the skin are called pores.

Excretory System

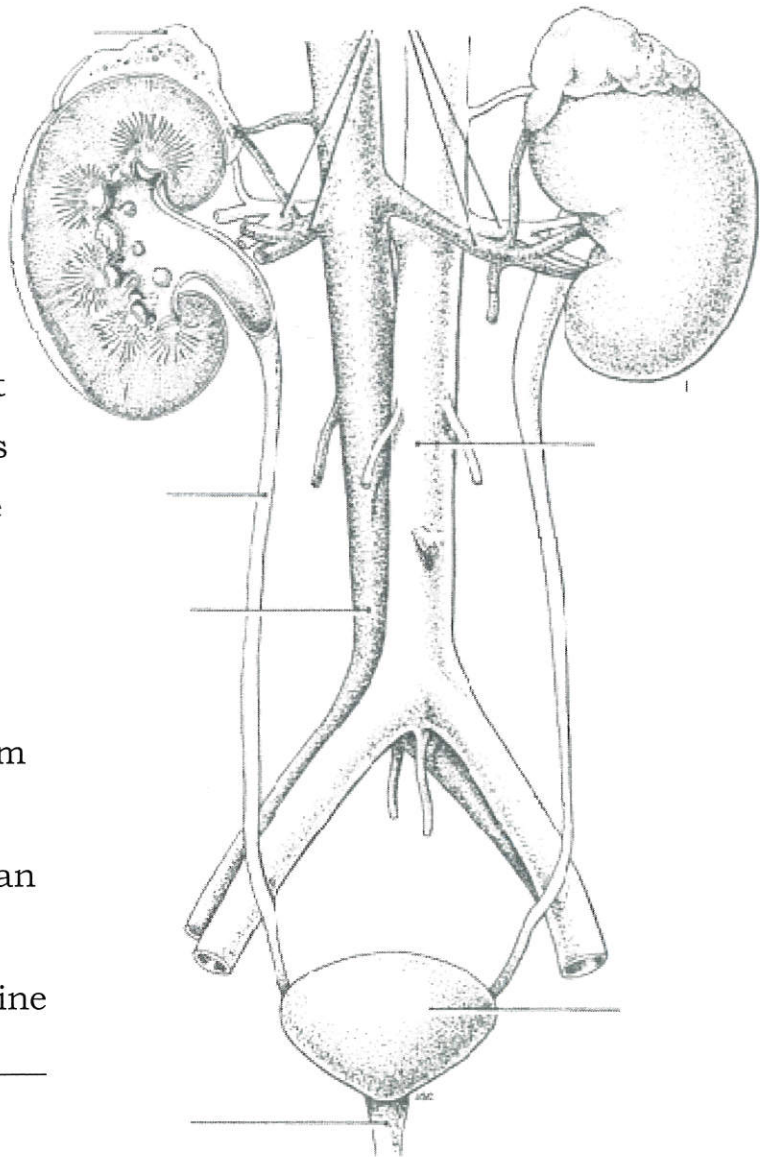
19

Functions of Excretory System

1. Rids blood of _____ (_____)
2. Controls blood volume by removing extra _____ produced by _____
3. Balances _____ and _____ so cells can function properly

Organs of the Excretory System

1. _____ = carries blood _____ the kidneys
2. _____ = carries blood _____ the kidneys
3. _____ = filter _____ that has collected _____ from cells
 - a. _____ = filters inside the kidneys
 - b. Produce _____ (sterile was fluid, _____ water)
4. _____ = tubes that lead from each _____ to _____
5. _____ = muscular organ that holds _____
6. _____ = tube that carries urine from the _____ out of the _____



Other Excretory Organs

1. _____ = releases _____ (water & salts) to _____ body
2. _____ = release _____ from the body

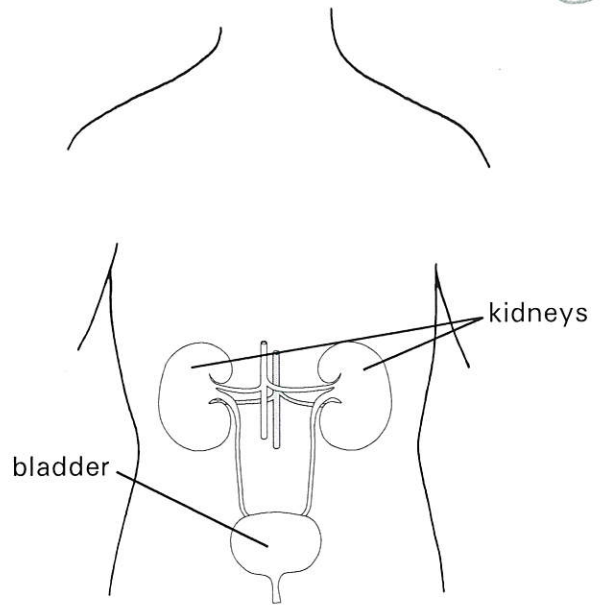
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The Excretory System

The job of the excretory system is to take waste out of the body. Another name for this system could be the body waste system. The kidneys form the most important part of the excretory system. Other organs that remove wastes are the lungs, the skin, the liver, and the large intestine.

What are the main organs of the excretory system like? The kidneys are two, reddish-brown organs about four inches long. They are in the lower back. One is on each side of the backbone. The kidneys are made of millions of tiny tubes and cells. These tubes pull liquid waste from the blood. This liquid is called urine. Urine is stored in the bladder until it is passed out of the body.

Other organs help the body get rid of wastes. As you breathe, the lungs remove carbon dioxide from the blood. The liver takes out tiny bits of waste floating in the blood. The large intestine, a part of the digestive system, takes in water and waste



from food that is not digested. The water is removed and the waste is passed out of the body.

The skin gives off waste by sweating. When you sweat, water and some salts pass through tiny openings in the skin. These openings are called pores.

1. What is the job of the excretory system? _____

2. Name five organs of the excretory system. _____

3. Tell how the kidneys help get rid of waste. _____

4. How does the skin give off waste? _____

Name: _____

Per: _____

21

Heart Beat Health Beat

TEKS: 7.12B – Identify the main functions of the systems of the human organism.

Objective: To observe how your heart responds to the body's changing needs for oxygen.

Materials: Heart Rate monitor
Timer

Procedure:

1. Predict how your pulse rate will change as you go from resting to being active, then back to resting again.
2. Locate your pulse by placing the index and middle finger of one hand on your other wrist at the base of your thumb. Move the two fingers slightly until you feel your pulse.
3. Begin by determining your resting pulse rate. Count the number of beats in your pulse for exactly 1 minute while your partner times you. Record the number in the data table on the next page.
4. Walk in place for 1 minute while your partner times you. Stop and immediately take your pulse for 1 minute. Record the number in your data table.
5. Run in place for 1 minute. Take your pulse again, and record the result.
6. Sit down right away, and have your partner time you as you rest for 1 minute. Then take your pulse rate again.
7. Have your partner time you as you rest for 3 more minutes. Then take your pulse rate again and record it.

Name: _____ Lab Partner: _____

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Heart Beat, Health Beat

Data Table

Activity	Pulse Rate
1. Resting	
2. Walking	
3. Running	
4. (1 min) Resting after Exercise	
5. (3+ min) Resting after Exercise	

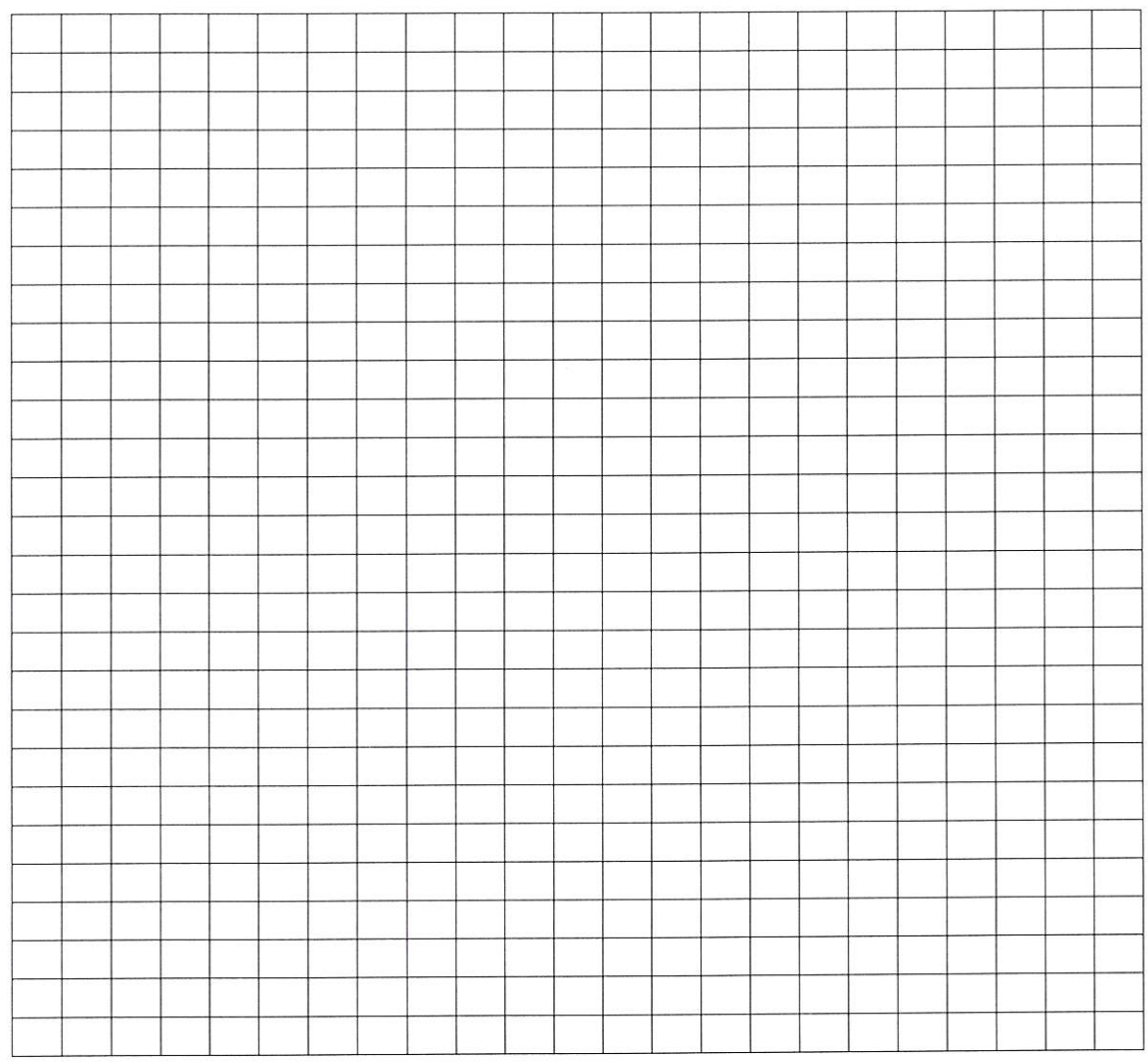
Analyze and Conclude

1. Use the data you obtained to create a bar graph of your pulse rate under the different conditions you tested.
2. What conclusion can you draw about the relationship between physical activity and a person's pulse rate?
3. What happens to the pulse rate when the physical activity has stopped?
4. What can you infer about the heartbeat when the pulse rate increases?
5. Do you think the pulse measurements you made are completely accurate? Why or why not?
6. How could you improve the accuracy of your measurements?
7. Why does your pulse rate change when you exercise? Explain how this is connected to homeostasis.

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Make a bar graph to compare the activity and the average pulse rate for each activity.

Title _____



_____ Label the Independent Variable (Don't forget units)

Respiratory System Notes

24

FUNCTIONS OF THE RESPIRATORY SYSTEM

1. supply _____ to the blood
2. remove _____ from the blood

What is the function of the respiratory system?

- a) to provide oxygen & carbon dioxide to the body cells
- b) to provide carbon dioxide to body cells & remove oxygen
- c) to provide oxygen to body cells & remove carbon dioxide
- d) to remove oxygen & carbon dioxide from the body cells

ORGANS OF THE RESPIRATORY SYSTEM

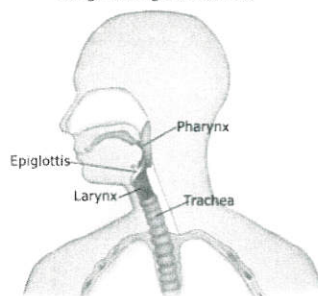
1. Nose & Mouth (air enters through the nostrils & mouth)

- a. _____ = air is cleaned, warmed, and moistened

2. Throat

- a. _____ = passageway for both _____ and _____
- b. _____ = flap that closes over the _____ when _____ to keep food & water out
- c. _____ = _____ only; _____ are attached here
- d. _____ (windpipe) = c-shaped rings of _____ keep it _____ all the time

The Throat and It's Neighboring Structures



Which of these does the nasal cavity NOT do to inhaled air?

- a) clean
- b) warm
- c) moisten
- d) condense

What is the flap called that prevents food from entering the larynx?

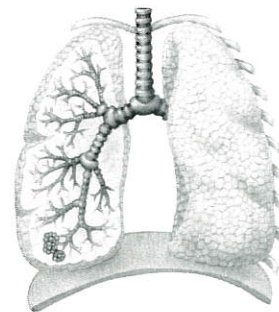
- a) pharynx
- b) epiglottis
- c) larynx
- d) trachea

What is the first structure that only air can pass through (not food)?

- a) mouth
- b) pharynx
- c) larynx
- d) trachea

3. Lungs (where oxygen & carbon dioxide are _____)

- a. _____ = 2 small branches at end of _____; carry _____ into lungs
- b. _____ = smaller branches off of _____
- c. _____ = tiny, grape-like sacs at the _____ of bronchioles; surrounded by _____

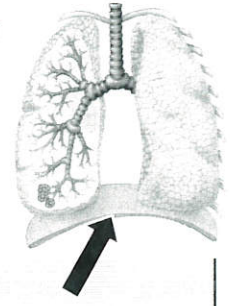


4. Diaphragm (_____ below the lungs that helps move _____ in and out of the body)

29

What is this structure called?

- a) bronchi
- b) bronchiole
- c) alveoli
- d) diaphragm



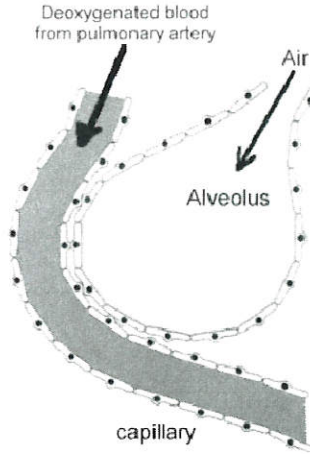
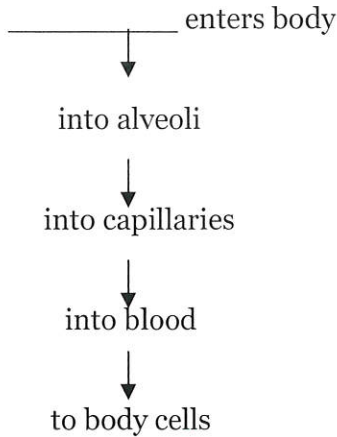
What causes you to exhale?

- a) Your lungs contract to squeeze air out.
- b) Your diaphragm moves up, pushing air out of the lungs.
- c) Your ribs squeeze the air out of your lungs.
- d) Your diaphragm moves down, letting air escape from your lungs.

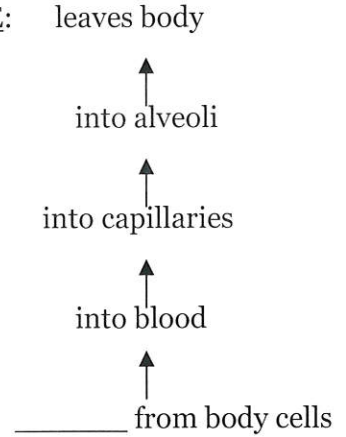
GAS EXCHANGE IN THE LUNGS

• takes place between _____ and _____

INHALE:



EXHALE:



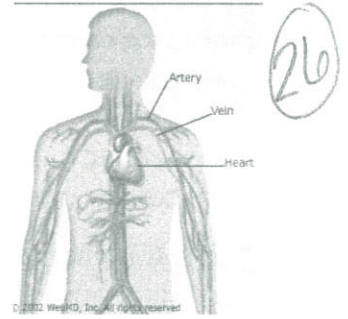
Where does the exchange of oxygen and carbon dioxide occur?

- a) the heart
- b) the alveoli
- c) the pharynx
- d) the body cells

What carries the blood back to the heart after it picks up oxygen from the alveoli?

- a) lungs
- b) aorta
- c) pulmonary artery
- d) pulmonary vein

Cardiovascular System Notes



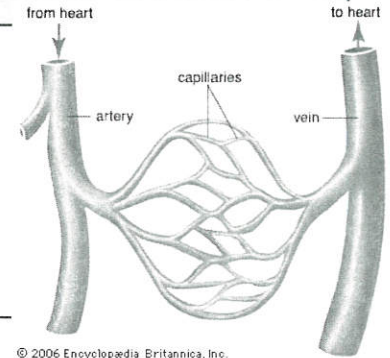
- cardio = _____ vascular = _____
- made up of _____, _____, and _____
- _____ system—blood stays _____ the vessels
- blood only flows _____-way

What is another name for the cardiovascular system?

- a) respiratory system b) circulatory system c) immune system d) skeletal system

TYPES OF BLOOD VESSELS

1. _____ = move blood _____ the heart
2. _____ = move blood _____ the heart
3. _____ = microscopic blood vessels that connect _____ & _____

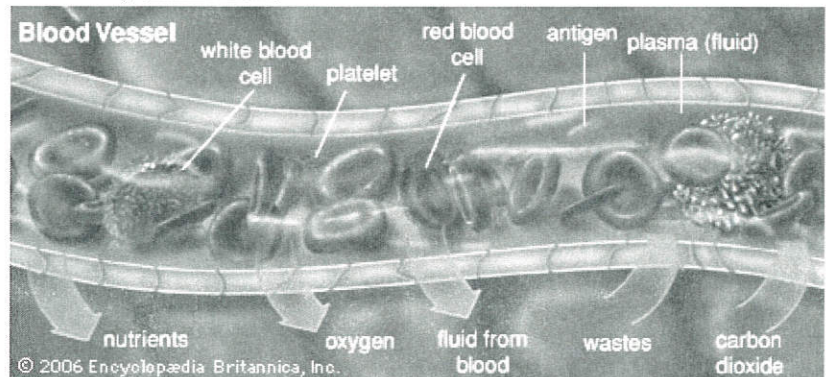


Which one of these vessels carries blood away from the heart?

- a) pulmonary vein b) renal vein c) renal artery d) superior vena cava

FUNCTIONS OF THE BLOOD

1. carries _____ from _____ to all body _____ & removes _____ from the _____
2. carries _____ products of cell activity to _____ to be removed from the body
3. transports _____ from digestive system to body _____
4. materials in blood help fight _____ and _____ wounds (_____ blood cells & _____)



Which 2 substances does the blood transport away from body cells?

- a) oxygen & carbon dioxide c) nutrients & waste
b) carbon dioxide & waste d) oxygen & nutrients

What parts of the blood help fight off disease and heal injuries?

- a) white blood cells & platelets c) white blood cells & red blood cells
b) red blood cells & platelets d) white blood cells & plasma

Which is NOT a function of the cardiovascular system?

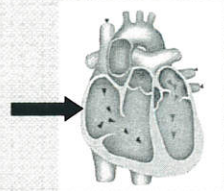
- a) carry nutrients & oxygen to body cells
b) carry carbon dioxide & waste away from body cells
c) attack disease-causing bacteria
d) produce chemicals that control body processes

27
What force causes blood to keep flowing through the body?

- a) the opening & closing of the valves in the heart
- b) gravity pushing blood through the veins
- c) cardiac muscle in the heart contracting and relaxing
- d) cardiac muscle in the blood vessels contracting and relaxing

What is this chamber called?

- a) right atrium
- b) left atrium
- c) right ventricle
- d) left ventricle



The pulmonary artery carries blood from the _____ to the _____.

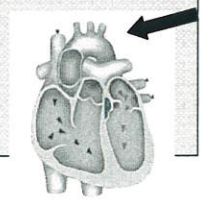
- a) heart, body
- b) heart, lungs
- c) lungs, heart
- d) lungs, body

When blood enters the left atrium from the lungs, what does it contain?

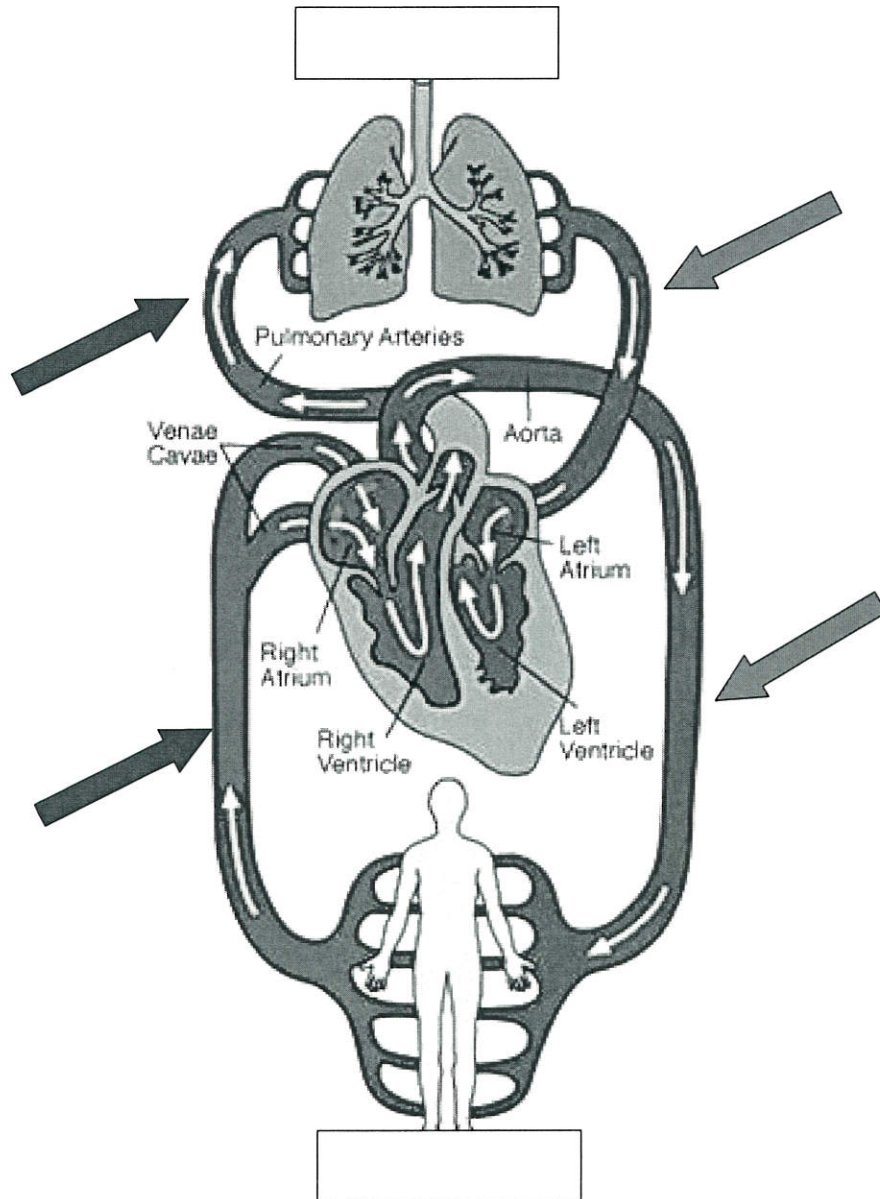
- a) no oxygen or carbon dioxide
- b) equal amounts of oxygen and carbon dioxide
- c) mostly carbon dioxide
- d) mostly oxygen

What is this structure called?

- a) superior vena cava
- b) aorta
- c) left atrium
- d) valve

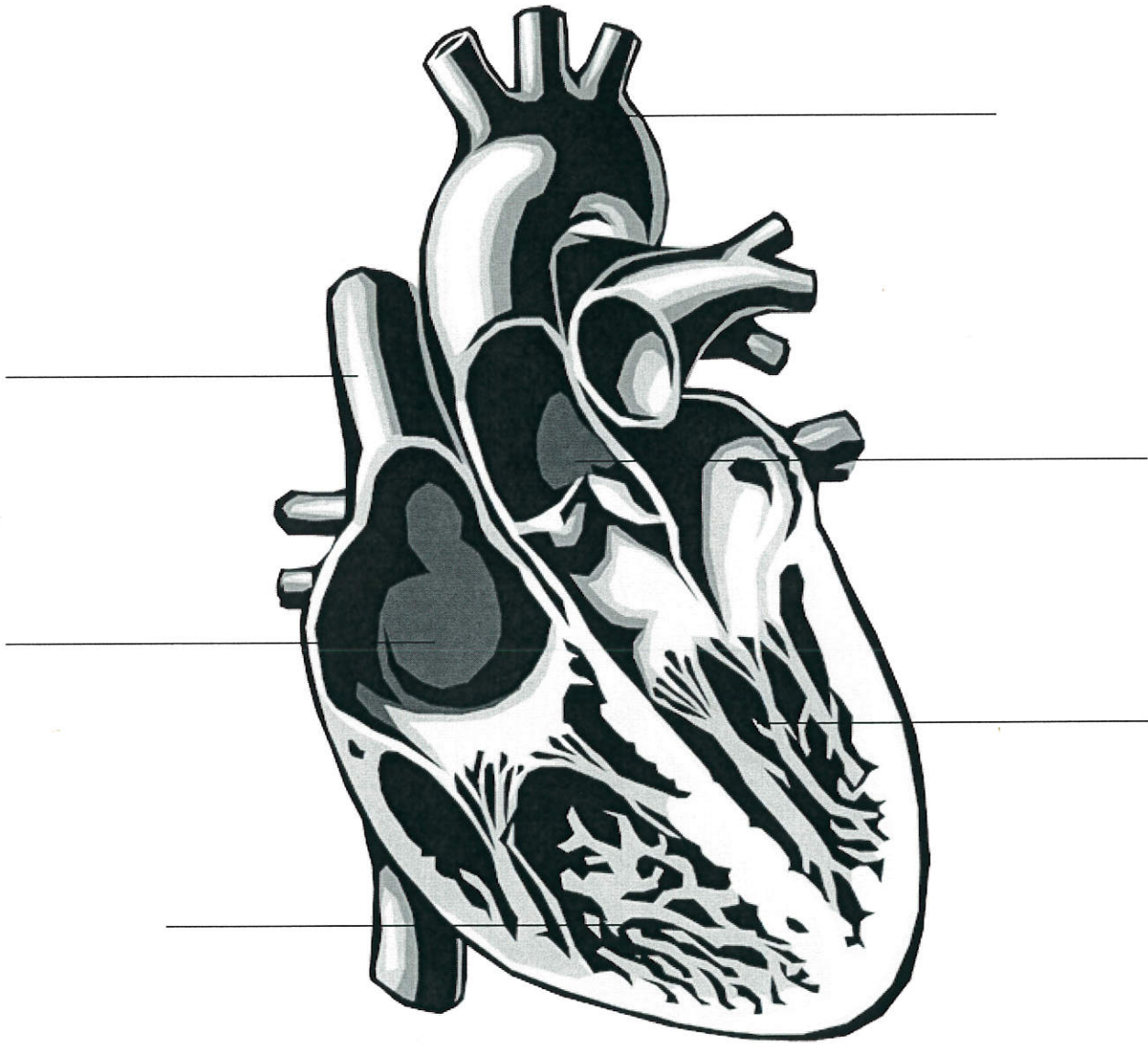


SUMMARY



The Human Heart

Label using the Word Bank. Draw arrows to show the direction of the flow of blood.



right ventricle
aorta
right atrium
vena cava
left ventricle
left atrium



Parts of the Heart

aorta - the biggest and longest artery (a blood vessel carrying blood away from the heart) in the body. It carries oxygen-rich blood from the left ventricle of the heart to the body.

inferior vena cava - a large vein (a blood vessel carrying blood to the heart) that carries oxygen-poor blood to the right atrium from the lower half of the body.

left atrium - the left upper chamber of the heart. It receives oxygen-rich blood from the lungs via the pulmonary vein.

left ventricle - the left lower chamber of the heart. It pumps the blood through the aortic valve into the aorta.

mitral valve - the valve between the left atrium and the left ventricle. It prevents the back-flow of blood from the ventricle to the atrium.

pulmonary artery - the blood vessel that carries oxygen-poor blood from the right ventricle of the heart to the lungs.

pulmonary valve - the flaps between the right ventricle and the pulmonary artery. When the ventricle contracts, the valve opens, causing blood to rush into the pulmonary artery. When the ventricle relaxes, the valves close, preventing the back-flow of blood from the pulmonary artery to the right atrium.

pulmonary vein - the blood vessel that carries oxygen-rich blood from the lungs to the left atrium of the heart.

right atrium - the right upper chamber of the heart. It receives oxygen-poor blood from the body through the inferior vena cava and the superior vena cava.

right ventricle - the right lower chamber of the heart. It pumps the blood into the pulmonary artery.

septum - the muscular wall that separates the left and right sides of the heart.

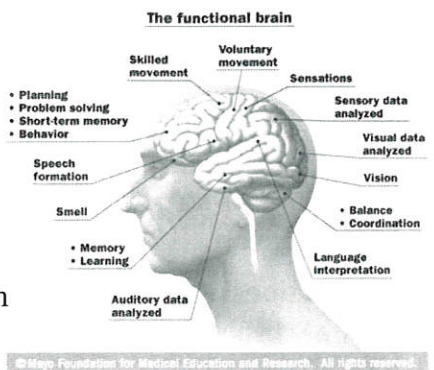
superior vena cava - a large vein that carries oxygen-poor blood to the right atrium from the upper parts of the body.

tricuspid valve - the flaps between the right atrium and the right ventricle. It is composed of three leaf-like parts and prevents the back-flow of blood from the ventricle to the atrium.

aortic valve - The flap of tissue between the left ventricle and the aorta. It prevents blood from flowing backward into the left ventricle.

Nervous System Notes

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FUNCTIONS OF THE NERVOUS SYSTEM

- the center of all thought, _____ and _____
- regulates and maintains _____ (a state of _____)
 - examples: body _____, _____, respiration, digestion
- keeps us in touch with our _____ and _____ environment

What is this part of the brain called?

- a) cerebrum b) cerebellum c) brain stem d) spinal cord

What is the function of the brain stem?

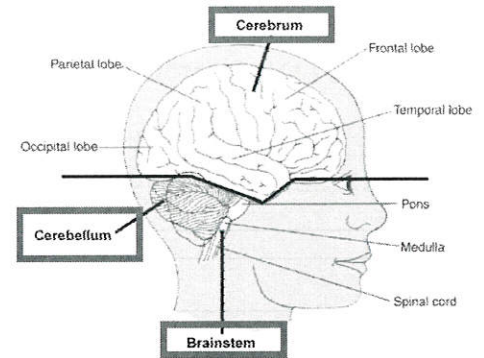
- a) controls homeostasis & voluntary muscles c) controls balance & coordinates muscles
 b) controls sense & voluntary muscles d) controls homeostasis & involuntary muscles

When you feel hungry, what function is your nervous system trying to carry out?

- a) maintaining homeostasis c) sensing your environment
 b) moving your body d) keeping your physical balance

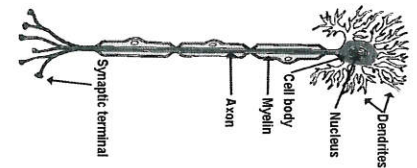
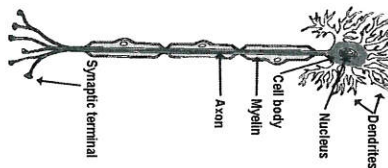
CENTRAL NERVOUS SYSTEM

- made up of _____ and _____
- three main parts of brain:
 - _____ - interprets input from _____ and controls _____ muscles
 - _____ - coordinates actions of _____ and helps keep your _____
 - _____ - controls _____ and coordinates _____ muscles



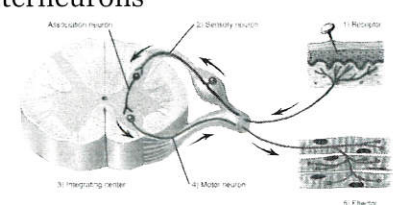
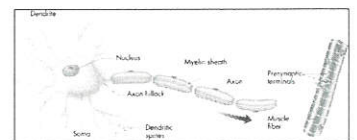
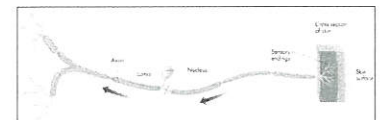
NERVE CELLS

- Nerve cells are called _____
- _____ - a _____ carried by a neuron
- _____ - the small space that an impulse jumps _____



TYPES OF NEURONS

- _____ neurons = can sense pressure, temperature, pain, and 5 senses
 - in _____, _____, _____ and sense organs (nose, tongue, eyes, ears)
 - _____ neurons = stimulate _____ throughout the body
 - includes muscles of the _____, _____, intestines, and bladder
 - _____ = _____ other neurons
 - _____ neurons in the _____ nervous system (brain, spinal cord) are interneurons
- _____ - an _____ response to a _____ (change in environment) that allows the body to respond quickly without thinking about it



3

What is an impulse?

- a) a nerve cell
- b) a message carried by neurons
- c) the space between two neurons
- d) a reflex

What is this structure called?

- a) axon
- b) synaptic terminal
- c) nucleus
- d) dendrite

What does a motor neuron stimulate?

- a) brain cells
- b) sensory organs
- c) muscle cells
- d) do sensory neurons

Which is not true about a reflex?

- a) It is a quick response.
- b) It is voluntary.
- c) It does not require conscious thought.
- d) It is a response to an external stimulus.

Immune System Notes

FUNCTION OF THE IMMUNE SYSTEM

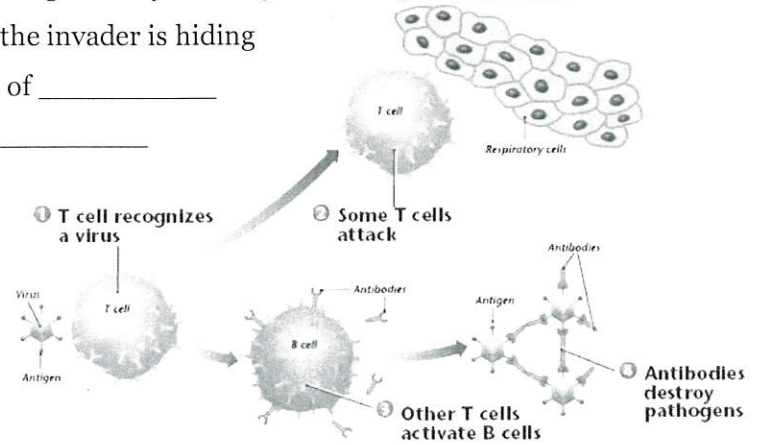
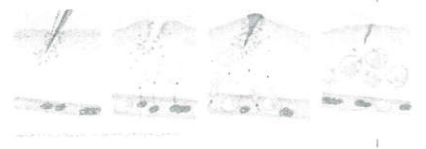
1. body's _____ against disease-causing organisms (_____)

Which of the following is a disease that is caused by a pathogen?

- a) diabetes
- b) cancer
- c) flu
- d) allergies

THREE LINES OF DEFENSE

1. _____ = keep pathogens from entering the body
 - _____, hairs & mucus in _____, sneezing & _____, saliva, _____ acids
2. _____ = when body cells are damaged
 - _____ = fluid & _____ blood cells leak from blood vessels into surrounding tissue
 - a) white blood cells (_____) = attack invaders & eat them
 - b) _____ = substances produced by body cells when attacked by viruses; interfere with the production of _____
3. _____ = distinguishes between different pathogens
 - a) white blood cells (_____) = patrol the body looking for invaders
 - send off chemical signals to _____ when an invader is found
 - b) _____ = _____ other cells in the immune system to the battle
 - this causes _____, swelling, & aches—signs that your body is working to _____ a disease
 - signal _____ where the invader is hiding
 - send chemical that increase production of _____
 - c) _____ = produce _____



How do your body's barriers help keep you healthy?

- a) keep pathogens inside your body
- b) keep pathogens out of your body
- c) interfere with the production of pathogens
- d) break down pathogens

What's the major difference between general response & immune response?

- a) General response can tell the difference between different pathogens.
- b) immune response can tell the difference between different pathogens.
- c) General response takes longer to respond to an invader.
- d) Immune response involves white blood cells.

Which best describes the relationship between macrophages & helper T-cells?

- a) Macrophages & helper T-cells both do the same job.
- b) Macrophages signal helper T-cells, which kill the invader.
- c) Macrophages signal helper T-cells, which signal other immune cells to fight the invader.
- d) Helper t-cells attack macrophages.

ANTIBODIES & ANTIGENS

- _____ = _____ produced by the immune system which _____ certain kinds of pathogens
- _____ = the part of the pathogen that the antibody _____ and _____

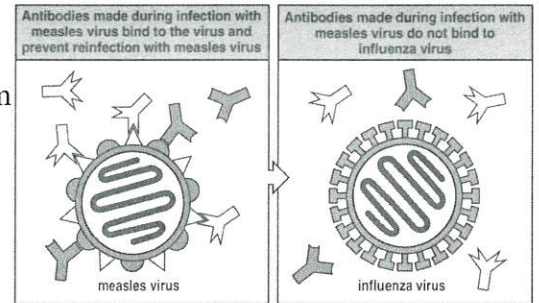
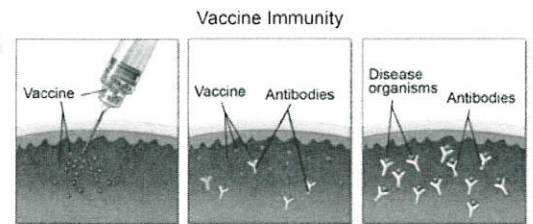


Figure 1-22 The Immune System, 2/e (© Garland Science 2005)

PREVENTING DISEASE

- no cure for _____ disease, only _____
 - _____ = made from damaged virus particles that can't cause disease anymore
- a) 1st Vaccine= Dr. Edward _____ (1798) developed a vaccine for _____ from the cowpox virus



Which is NOT true about the relationship between antibodies & antigens?

- a) Every pathogen has a unique antigen on its surface.
- b) The first time an antigen enters your body, you already have an antibody for it.
- c) Each antibody can only bind to a specific antigen.
- d) The second time an antigen enters your body, the antibodies will recognize & kill it.

If you had chicken pox once, what would happen if you were exposed to the virus again?

- a) Your body wouldn't be able to fight the virus & you would get sick.
- b) Your body would have antibodies from the first time you had chicken pox & you wouldn't get sick.
- c) Your body would make different antibodies than the first time & you wouldn't get sick.
- d) The virus would recognize the antibodies & leave.

Which type of disease can be prevented by a vaccine?

- a) virus
- b) bacteria
- c) fungus
- d) parasites

Why doesn't the flu virus used in the flu vaccine make you sick?

- a) The virus does make you sick
- b) There is no virus in the vaccine.
- c) The virus can't reproduce.
- d) The part of the virus that makes you sick was removed.

Integumentary System Notes

FUNCTIONS OF THE INTEGUMENTARY SYSTEM

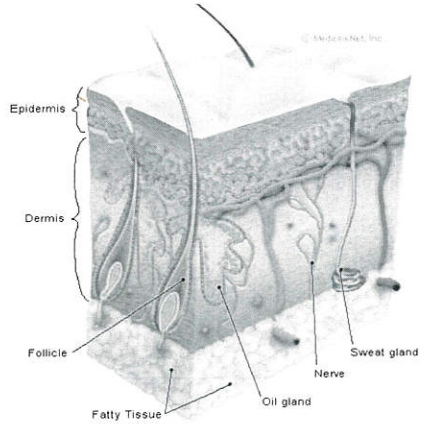
1. forms a _____ over the body
2. maintains _____—regulates _____
3. _____—sodium chloride (salt), water, urea
4. _____ organ—nerve endings are sensitive to _____, _____, & _____
5. produces _____ in the epidermis using _____ -

Which is NOT a function of the integumentary system?

<p>a) to prevent substances from entering the body</p> <p>b) to help keep body temperature stable</p>	<p>c) to remove wastes from the body</p> <p>d) to absorb oxygen into the body</p>
---	---

LAYERS OF SKIN

1. _____ = surface layer
 - a) cells on top are _____
 - b) _____ are constantly produced at the bottom
 - c) cells produce _____ (pigment that gives you skin color)
2. _____ = layer under epidermis
 - a) _____ than epidermis
 - b) contains blood vessels, nerves, oil and sweat glands
 - c) _____ stored under the dermis



Which part of the skin makes new skin cells?

a) epidermis	b) dermis	c) fat cells	d) sweat glands
b)			

Integumentary and Nervous System Investigation Answer Sheet

Part 1: The Skin You're In

1. a. How does the skin of your palm differ from that on the back of your hand?

- b. Describe any regular patterns you observe.

2. In your observations describe the appearance of these features.

3. Use the hand magnifier or stereoscope to compare the type and distribution of hairs on the front and back of your forearm.

4. Describe the differences you observed in the type and distribution of hair on the front and back of your forearm.

5. Examine the point at which the hair comes out of the skin using a magnifier or stereoscope. Describe the area immediately around the hair and the angle at which the hair leaves the skin.

6. Pull on the skin of the back of your hand and the palm. Record your observations.

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7. Use the magnifier and stereoscope to examine your fingernails. Draw what you see.

8. What are the functions of the parts of the integumentary system you just observed?

Part 2: Plotting the Distribution of Sweat Glands

1. Record the number of blue-black dots on each square. The appearance of a blue-black dot indicates the appearance of an active sweat gland. (The iodine in the pore dissolves in the sweat and reacts with the starch in the paper to produce the color.)

2. Which skin area tested has more sweat glands?

3. What areas of the body do you think have the most sweat glands?

4. Why do you think these areas have more sweat glands?

5. How does the nervous and integumentary system work together to respond to the internal stimuli of temperature?

Part 3: Microscopic Examination of Hair

1. Illustrate your observation when viewing the arm hair under medium or high power. Be sure to document the total magnification of the image you drew.

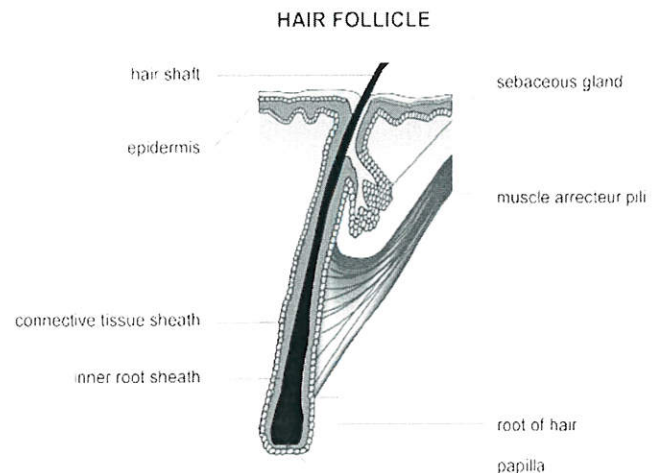
2. Illustrate your observation when viewing the eyebrow hair under medium or high power. Be sure to document the total magnification of the image you drew.

3. Illustrate your observation when viewing the hair under medium or high power. Be sure to document the total magnification of the image you drew.

4. How were the three types of hair similar?

5. How were the three types of hair different?

6. Explain how your nervous system interacts with hair follicles in your skin in response to external stimuli?



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Part 4: Testing Tactile Localization

1.

Tactile Localization

Body Area Tested	Error of Localization, mm (distance between marks)			
	Trial 1	Trial 2	Trial 3	Average
Palm of hand				
Fingertip				
Forearm				
Back of hand				

- Record the data in the table.
- Does the ability to locate the stimulus improve the second time? The third time? _____
- Why do you think this happened?

- Which area has the smallest error of localization and is therefore the most sensitive to touch? _____
- Why do you think this is the most sensitive area to touch?

- How does the nervous system use the ability to sense touch to regulate our bodies?

- Describe ways our body might respond to touch stimuli from receptors in our skin? Give specific examples.

Part 5: Demonstrating Adaptation of Touch Receptors

- 1. Record your data in the table below

Adaptation of Touch Receptors

Location	Number of Pennies	Length of Time of Sensation (seconds)	
		Subject A	Subject B
Location 1 on forearm	1		
Location 2 on forearm	1		
Location 2 on forearm	4		

- 2. Are the same receptors being stimulated when the four coins, rather than one coin, are used? Explain your reasoning.

- 3. Why do you think we stop feeling the sensation over time? How is this helpful?_____

- 4. What was the stimulus when more coins were added to the one you did not feel?_____

- 5. What are some examples of responses your body's nervous system would need to make in response to a stimulus of changes in the amount of pressure on the skin?_____

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Part 6: Two-Point Sensibility

1. What are the independent and dependent variables of this investigation?
2. Record the data in the table below

Location	Distance between the ends of the paper clip			
	.5 cm	1 cm	2 cm	3 cm
Inner surface of forearm				
Neck				
Fingertip				

3. Which body area tested has the greatest density of touch receptors?

4. How do you know?

5. In which layer of the skin are these pressure receptors found?

6. Why do some areas of your skin need more touch receptors than others?

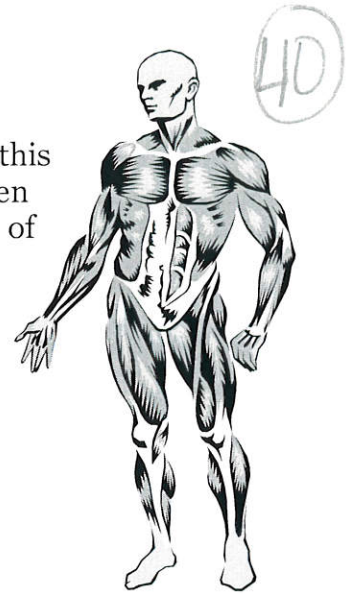
7. How does the nervous system and the integumentary system work together to give you fine motor control? (*read the introduction for more information*)

How Do Your Muscles Work?

Name: _____ Per: _____

INTRODUCTION

Much of the work of the body depends on the contraction of skeletal muscles. In this experiment you will first observe the characteristics of muscle contraction and then will investigate the effects of two factors—temperature and fatigue—on the action of your muscles.



MATERIALS

bowl of water
ice
stopwatch

narrow strip of paper which will fit around upper arm
rubber ball or clothespin

PROCEDURE & DATA ANALYSIS

The following exercises will help you understand what happens to your muscles when they contract.

Muscle Action

1. Place your fingers along the angle of your jaw just in front of your ear. Grit your teeth and observe what happens to the hardness of the muscles in your cheek.

What change do you observe in the muscle while it is working (contracting)? _____

2. With the thumb and little finger of one hand, span the opposite arm's biceps (front muscle of the upper arm) from the elbow to as close to the shoulder as possible. Bend the arm and observe the change in the length of the muscle.

What change do you observe in the muscle while it is contracting? _____

3. Wrap a strip of paper around your upper arm and mark the circumference of your arm on the paper. Clench your fist tightly and mark the new circumference on the paper. Observe what happens to the circumference of the muscle.

What change do you observe in the muscle while it is contracting? _____

Effect of Temperature on Muscle Action

1. Count the number of times you can make a fist in 20 seconds. Start with your hand completely outstretched and make a tight fist each time. Do it as rapidly as you can. Record the number of fists in Figure 1.
2. Now submerge your hand in a bowl of ice water. The ice has been added so that the temperature of the water is near freezing. Leave your hand in the water for 1 full minute.
3. Remove your hand from the water and immediately count how many tight fists you can make in 20 seconds. Record the number of fists in Figure 1.

Figure 1: Effect of Temperature on Muscle Action

Temperature	Number of Fists
Normal	
Ice Water	

What effect did the cold temperature have on the action of your hand muscles? EXPLAIN.

Effect of Fatigue on Muscle Action

1. Count how many times you can tightly squeeze a rubber ball in your hand in 20 seconds. Record the number of squeezes in Figure 2.
2. Repeat Step 1 nine more times and record your results. Do not rest between trials.
3. Make a line graph of your results.

Figure 2: Effect of Fatigue on Muscle Action

Trial	# of Squeezes
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Number of Squeezes



Trials

What effect did fatigue have on the action of your hand muscles? EXPLAIN.

Skeletal System Notes

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Name: _____

What is this bone called?

Bone #1:

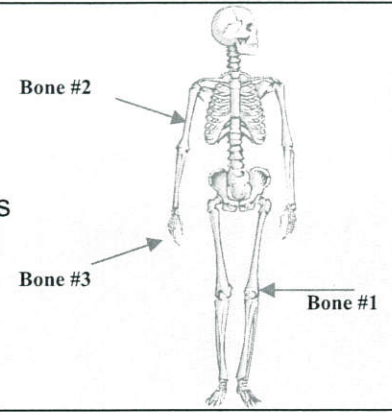
- a) patella
- b) vertebrae
- c) cranium
- d) sternum
- a)

Bone #2:

- a) femur
- b) tibia
- c) humerus
- d) fibula

Bone #3:

- a) tarsals
- b) phalanges
- c) metacarpals
- d) carpals



FUNCTIONS OF THE SKELETAL SYSTEM

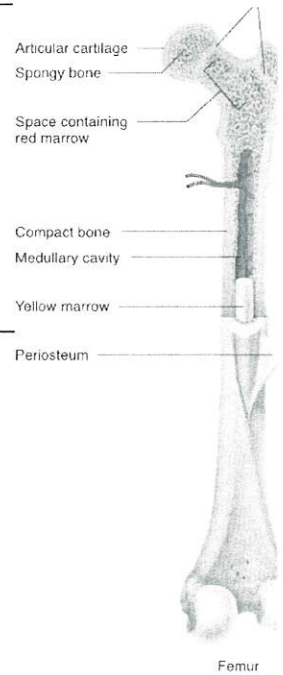
1. Framework gives _____ & _____ to body
2. Bones _____ the _____ organs
3. Major _____ of body are _____ to the bones
4. _____ cells are formed in _____ of some bones
5. Skeleton is a place where major quantities of _____ and _____ compounds are _____

Which is NOT a function of the skeletal system?

- a) to make new blood cells
- b) to protect vital organs like your heart, lungs & brain
- c) to store nutrients
- d) to move your body

BONE STRUCTURE

1. _____: covered with tough, tight fitting _____ called _____
 - a) Blood _____ carry _____ into the bone
 - b) Important in the _____ and _____ of bone
2. _____ bone: under the _____
 - a) Contains bone _____, blood vessels, minerals and _____ fibers
 - b) Elastic fibers keep bone _____
 - c) 2 diseases that result from a lack of _____ in bone: rickets, _____
3. _____ bone: found towards the _____ of the bone
 - a) Less _____
 - b) Has many small _____ spaces that make the bone _____
4. _____: a _____ tissue that fills the cavities, or _____, in bones
 - a) Produces _____ blood cells—2-3 _____ per second
 - b) Produces _____ blood cells
5. _____: thick _____ layer of tissue that _____ the _____ of the bones
 - a) Flexible, important at the _____ because it absorbs _____ and makes movement easier



What part of the bone contains elastic fibers for flexibility?

- a) bone marrow
- b) compact bone
- c) cartilage
- d) spongy bone

What part of the bone makes new blood cells?

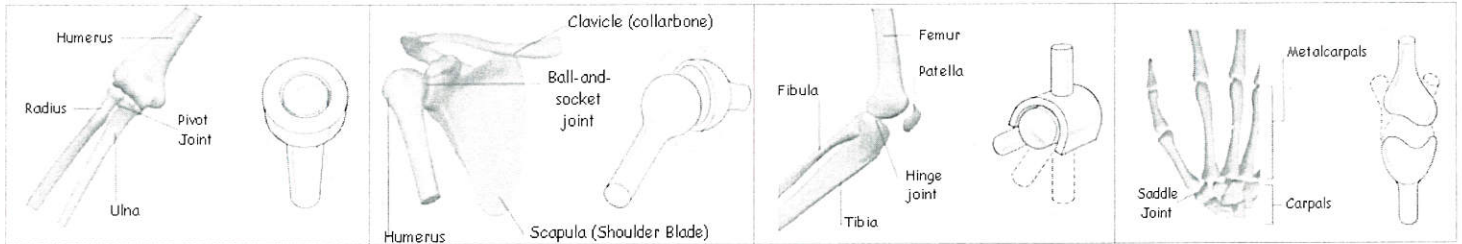
- a) bone marrow
- b) compact bone
- c) cartilage
- d) spongy bone

What part of the bone makes new bone cells?

- a) bone marrow
- b) compact bone
- c) periosteum
- d) spongy bone

JOINTS

- Any place where _____ or more bones _____
- _____: tough bands of _____ that hold _____ at the joints
- _____ of Joints
 - a) _____: allows little or _____ movement (_____, _____)
 - b) _____: allows body to make a wide range of _____
 1. _____: 1 _____ in the ring of another (_____, _____)
 2. _____: 1 bone has a _____ end that fits into a _____ - _____ cavity on another bone (_____, _____)
 3. _____: has a back and _____ movement (_____, _____, _____)
 4. _____: 1 part of the bone glides over _____ bone (_____, _____)



What is the tissue called that holds bones together at the joints?

- a) joint
- b) ligament
- c) tendon
- d) cartilage

Which type of joint only allows movement going backward & forward?

- a) pivot
- b) ball-and-socket
- c) hinge
- d) gliding

Which type of joint allows for the greatest range of movement?

- a) fixed
- b) ball-and-socket
- c) hinge
- d) gliding

Muscular System Notes

Name: _____

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What is this muscle called?

Muscle #1:

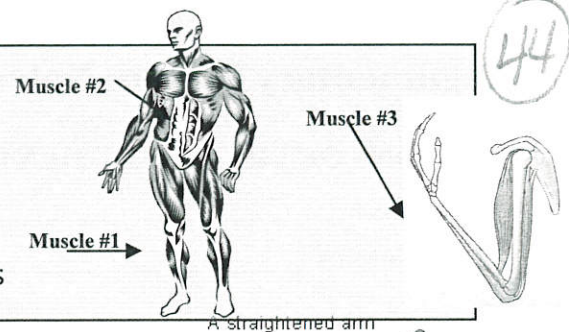
- a) gluteus maximus
- b) quadriceps
- c) gastrocnemius
- d) soleus

Muscle #2:

- a) pectoralis
- b) deltoid
- c) trapezius
- d) triceps

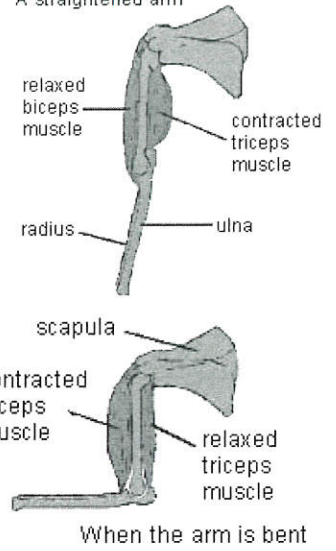
Muscle #3:

- a) biceps
- b) triceps
- c) internal obliques
- d) external obliques



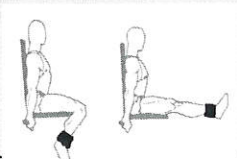
FUNCTIONS OF THE MUSCULAR SYSTEM

1. Muscles are the _____ that _____ body parts
 - a) Muscles always _____, they _____
 - b) _____ of skeletal muscles work _____: 1 muscle _____ while the other muscle _____
2. Maintain _____ by keeping body temperature _____
 - a) When muscles contract, _____ energy (glucose) is converted to _____ energy (heat)



When sitting, what must your thigh muscles do to straighten your legs?

- a) one muscle contracts while the other relaxes
- b) both muscles contract
- c) both muscles relax
- d) one muscle pulls on the bone & the other pulls on the first muscle

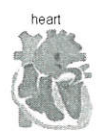
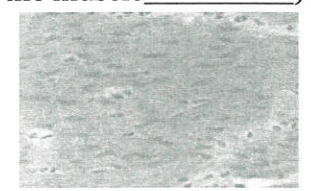
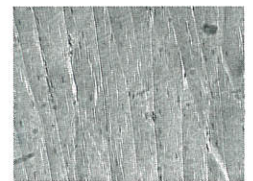


GROUPS OF MUSCLES

1. _____—you _____ control these (_____, _____, _____, _____)
2. _____—you _____ control these, don't have to decide to make these muscles work (muscles around _____)

TYPES OF MUSCLE TISSUE _____ muscle

1. _____ muscle
 - a) Most numerous in body
 - b) _____
 - c) Looks _____ (_____)
 - d) Contract _____, tire _____
 - e) Attached to the _____ by _____
2. _____ muscle
 - a) Found in: walls of _____, _____, _____, etc.
 - b) _____
 - c) _____ striations
 - d) Contracts and relaxes _____
3. _____ muscle
 - a) Only found in _____
 - b) _____
 - c) Has _____
 - d) Contracts _____ times per minute (_____)



What attaches muscle to bone?

- a) cartilage
- b) muscles
- c) tendons
- d) ligaments

Which picture shows smooth muscle?

- a)
- b)
- c)
- d)

What type of muscle is involuntary and striated?

- a) skeletal
- b) smooth
- c) intestinal
- d) cardiac

Which is NOT a function of the muscular system?

- a) to move your body
- b) to help protect other organs
- c) to help digest food
- d) to help pump blood

